

SEQUENCE LISTING

<110> TSUBOUCHI, Kozo
YAMADA, Hiromi

<120> EXTRACTION AND UTILIZATION OF CELL
GROWTH-PROMOTING PEPTIDES FROM SILK PROTEIN

<130> OPS 635

<140> US 10/789 494

<141> 2004-02-27

<150> JP 2003-55048

<151> 2003-02-28

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<213> *Bombyx mori*

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Val Ile Thr Thr Asp Ser Asp Gly Asn Glu

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Asn Ile Asn Asp Phe Asp Glu Asp
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Ala Ala Ser Ser Val Ser Ser Ala Ser Ser Arg Ser Tyr Asp
5 10
Tyr Ser Arg Arg Asn Val Arg Lys Asn
15 20

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala His Gly Gly Tyr
5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

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<213> *Antheraea yamamai*

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Tyr Gly Trp Gly Asp Gly Gly Tyr Gly Ser Asp Ser

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<213> *Antheraea yamamai*

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Asp Glu Tyr Val Asp Asn

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Val Glu Thr Ile Val Leu Glu Glu Asp Pro Tyr Gly His Glu

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Asp Ile Tyr Glu Glu Asp

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<211> 13
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Asp Asp Gly Phe Val Leu Asp Gly Gly Tyr
5 10
Asp Ser Glu

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<220>

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Met Arg Val Lys Thr Phe Val Ile Leu Cys Cys Ala Leu Gln
5 10
Tyr Val Ala Tyr Thr Asn Ala Asn Ile Asn Asp Phe Asp Glu
15 20 25
Asp Tyr Phe Gly Ser Asp Val Thr Val Gln Ser Ser Asn Thr
30 35 40
Thr Asp Glu Ile Ile Arg Asp Ala Ser Gly Ala Val Ile Glu
45 50 55
Glu Gln Ile Thr Thr Lys Lys Met Gln Arg Lys Asn Lys Asn
60 65 70
His Gly Ile Leu Gly Lys Asn Glu Lys Met Ile Lys Thr Phe
75 80
Val Ile Thr Thr Asp Ser Asp Gly Asn Glu Ser Ile Val Glu
85 90 95
Glu Asp Val Leu Met Lys Thr Leu Ser Asp Gly Thr Val Ala
100 105 110

Gln Ser Tyr Val Ala Ala Asp Ala Gly Ala Tyr Ser Gln Ser
115 120 125
Gly Pro Tyr Val Ser Asn Ser Gly Tyr Ser Thr His Gln Gly
130 135 140
Tyr Thr Ser Asp Phe Ser Thr Ser Ala Ala Val
145 150

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<220>

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr
5 10
Ser Arg Ser Asp Gly Tyr Glu Tyr Ala Trp Ser Ser Asp Phe
15 20 25
Gly Thr .
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<213> *Bombyx mori*

<220>

<400> 11

Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala His Gly Gly Tyr

5

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Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly

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Thr

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr

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Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly

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Thr

<210> 13

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<213> *Bombyx mori*

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala His Gly Gly Tyr

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Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly

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Thr

<210> 14
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<213> *Bombyx mori*

<220>

<400> 14
Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala His Gly Gly Tyr
5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

<210> 15
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<213> *Bombyx mori*

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5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

<210> 16
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<213> *Bombyx mori*

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr
5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

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<213> *Bombyx mori*

<220>

<400> 17

Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr
5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

<210> 18

<211> 28

<212> PRT

<213> *Bombyx mori*

<220>

<400> 18

Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr Ser
5 10
Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly Thr
15 20 25

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<213> *Bombyx mori*

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Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr
5 10
Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly
15 20 25
Thr

<210> 20
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<212> PRT
<213> *Bombyx mori*

<220>

<400> 20
Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala Asn Gly Gly Tyr
5 10
Ser Arg Arg Glu Gly Tyr Glu Tyr Ala Trp Ser Ser Lys Ser
15 20 25
Asp Phe Glu Thr
30

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<213> *Bombyx mori*

<220>

<400> 21

Ala Ala Ser Ser Val Ser Ser Ala Ser Ser Arg Ser Tyr Asp
5 10
Tyr Ser Arg Arg Asn Val Arg Lys Asn Cys Gly Ile Pro Arg
15 20 25
Arg Gln Leu Val Val Lys Phe Arg Ala Leu Pro Cys Val Asn
30 35 40
Cys

<210> 22

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<213> *Bombyx mori*

<220>

<400> 22

Met Lys Pro Ile Phe Leu Val Leu Leu Val Ala Thr Ser Ala
5 10
Tyr Ala Ala Pro Ser Val Thr Ile Asn Gln Tyr Ser Asp Asn
15 20 25
Glu Ile Pro Arg Asp Ile Asp Asp Gly Lys Ala Ser Ser Val
30 35 40
Ile Ser Arg Ala Trp Asp Tyr Val Asp Asp Thr Asp Lys Ser
45 50 55
Ile Ala Ile Leu Asn Val Gln Glu Ile Leu Lys Asp Met Ala
60 65 70
Ser Gln Gly Asp Tyr Ala Ser Gln Ala Ser Ser Val Ala Gln
75 80
Thr Ala Gly Ile Ile Ala His Leu Ser Ala Gly Ile Pro Gly
85 90 95
Asp Ala Cys Ala Ala Ala Asn Val Ile Asn Ser Tyr Thr Asp
100 105 110

Gly Val Arg Ser Gly Asn Phe Ala Gly Phe Arg Gln Ser Leu
115 120 125
Gly Pro Phe Phe Gly His Val Gly Gln Asn Leu Asn Leu Ile
130 135 140
Asn Gln Leu Val Ile Asn Pro Gly Gln Leu Arg Tyr Ser Val
145 150
Gly Pro Ala Leu Gly Cys Ala Gly Gly Gly Arg Ile Tyr Asp
155 160 165
Phe Glu Ala Ala Trp Asp Ala Ile Leu Ala Ser Ser Asp Ser
170 175 180
Ser Phe Leu Asn Glu Glu Tyr Cys Ile Val Lys Arg Leu Tyr
185 190 195
Asn Ser Arg Asn Ser Gln Ser Asn Asn Ile Ala Ala Tyr Ile
200 205 210
Thr Ala His Leu Leu Pro Pro Val Ala Gln Val Phe His Gln
215 220
Ser Ala Gly Ser Ile Thr Asp Leu Leu Arg Gly Val Gly Asn
225 230 235
Gly Asn Asp Ala Thr Gly Leu Val Ala Asn Ala Gln Arg Tyr
240 245 250
Ile Ala Gln Ala Ala Ser Gln Val His Val
255 260

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<213> *Antheraea yamamai*

<220>

<400> 23

Met Arg Val Thr Ala Phe Val Ile Leu Cys Cys Ala Leu Gln
5 10
Tyr Ala Thr Ala Asn Asn Leu His His His Asp Glu Tyr Val
15 20 25
Asp Asn His Gly Gln Leu Val Glu Arg Phe Thr Thr Arg Lys
30 35 40
His Tyr Glu Arg Asn Ala Ala Thr Arg Pro His Leu Ser Gly
45 50 55
Asn Glu Arg Leu Val Glu Thr Ile Val Leu Glu Glu Asp Pro
60 65 70
Tyr Gly His Glu Asp Ile Tyr Glu Glu Asp Val Val Ile Asn
75 80
Arg Val Pro Gly Ala Ser Ser Ser Ala Ala Ala Ala Ser Ser
85 90 95
Ala Ser Ala Gly Ser Gly Gln Thr Ile Ile Val Glu Arg Gln
100 105 110
Ala Ser His Gly Ala Gly Gly Ala
115 120

<210> 24

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<213> *Antheraea yamamai*

<220>

<400> 24

Ala Gly Ala Ala Ala Gly Ala Ala Ala Gly Ser Ser Ala Arg
5 10
Gly Gly
15

<210> 25

<211> 45
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<213> *Antheraea yamamai*

<220>

<400> 25
Ser Gly Phe Tyr Glu Thr His Asp Ser Tyr Ser Ser Tyr Gly
5 10
Ser Gly Ser Ser Ser Ala Ala Ala Ala Ser Ser Gly Ala Gly
15 20 25
Gly Ala Gly Gly Gly Tyr Gly Trp Gly Asp Gly Gly Tyr Gly
30 35 40
Ser Asp Ser
45

<210> 26
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<213> *Anthraea yamamai*

<220>

<400> 26
Gly Ser Gly Ala Gly Gly Arg Gly Asp Gly Gly Tyr Gly Ser
5 10
Gly Ser Ser
15

<210> 27
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<220>

<400> 27

Arg Arg Ala Gly His Asp His Ala Ala Gly Ser Ser Gly Gly
5 10
Gly Tyr Ser Trp Asp Tyr Ser Ser Tyr Gly Ser Glu Ser
15 20 25

<210> 28

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<213> *Antheraea yamamai*

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<400> 28

Gly Ser Gly Ala Gly Gly Val Gly Gly Gly Tyr Gly Gly Gly
5 10
Asp Gly Gly Tyr Gly Ser Gly Ser Ser
15 20

<210> 29

<211> 11

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 29

Arg Arg Ala Gly His Asp Arg Ala Ala Gly Ser
5 10

<210> 30

<211> 21

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 30

Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Gly Asp

5

10

Gly Gly Tyr Gly Ser Asp Ser

15

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<210> 31

<211> 8

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<213> *Antheraea yamamai*

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<400> 31

Gly Ser Gly Ala Gly Arg Ala Gly

5

<210> 32

<211> 14

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 32

Gly Asp Tyr Gly Trp Gly Asp Gly Gly Tyr Gly Ser Asp Ser

5

10

<210> 33

<211> 11
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<400> 33
Arg Gln Ala Gly His Glu Arg Ala Ala Gly Ser
5 10

<210> 34
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<400> 34
Ser Gly Ala Gly Gly Ser Gly Arg Gly Tyr Gly Trp Gly Asp
5 10
Gly Gly Tyr Gly Ser Asp Ser
15 20

<210> 35
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<213> *Antheraea yamamai*

<220>

<400> 35

Gly Ser Gly Ala Gly Gly Ala Gly Gly Asp Tyr Gly Trp Gly

5

10

Asp Gly Gly Tyr Gly Ser Asp

15

20

<210> 36

<211> 22

<212> PRT

<213> *Antheraea yamamai*

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<400> 36

Gly Ser Gly Ala Gly Gly Ala Gly Gly Asp Tyr Gly Trp Gly

5

10

Asp Gly Gly Tyr Gly Ser Asp Ser

15

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<212> PRT

<213> *Antheraea yamamai*

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<400> 37

Ser Gly Ala Gly Gly Ala Gly Gly Gly Tyr Gly Trp Gly Asp

5

10

Gly Gly Tyr Gly Ser Asp Ser

15

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<210> 38

<211> 16

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 38

Ser Gly Ala Gly Gly Ala Gly Gly Tyr Gly Gly Tyr Gly Ser

5

10

Asp Ser

15

<210> 39

<211> 21

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 39

Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Gly Asp

5

10

Gly Gly Tyr Gly Ser Gly Ser

15

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<213> *Antheraea yamamai*

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Gly Ser Gly Ala Gly Gly Val Gly Gly Gly Tyr Gly Trp Gly

5

10

Asp Gly Gly Tyr Gly Ser Asp Ser

15

20

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<213> *Antheraea yamamai*

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Ser Gly Ala Gly Gly Arg Gly Asp Gly Gly Tyr Gly Ser Gly

5

10

Ser Ser

15

<210> 42

<211> 22

<212> PRT

<213> *Antheraea yamamai*

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Gly Ser Gly Ala Gly Gly Ala Gly Gly Gly Tyr Gly Trp Gly

5

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Asp Gly Gly Tyr Gly Ser Asp Ser

15

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<400> 43

Arg Arg Ala Gly His Asp Arg Ala Ala Gly Cys
5 10

<210> 44

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<213> *Antheraea yamamai*

<220>

<400> 44

Ser Gly Ala Gly Gly Thr Gly Gly Gly Tyr Gly Trp Gly Asp
5 10
Gly Gly Tyr Gly Ser Asp Ser
15 20

<210> 45

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<213> *Antheraea yamamai*

<220>

<400> 45

Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Gly Asp
5 10
Gly Gly Tyr Gly Ser Asn Ser
15 20

<210> 46
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<213> *Antheraea yamamai*

<220>

<400> 46
Ser Gly Ala Gly Arg Ser Gly Gly Gly Tyr Gly Trp Gly Asp
5 10
Gly Gly Tyr Ser Ser Asp Ser
15 20

<210> 47
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<212> PRT
<213> *Antheraea yamamai*

<220>

<400> 47
Ser Gly Ala Gly Gly Ser Gly Gly Tyr Gly Gly Tyr Gly Ser
5 10
Asp Ser
15

<210> 48
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<220>

<400> 48

Gly Ser Gly Ala Gly Gly Val Gly Gly Gly Tyr Gly Trp Gly

5

10

Asp Gly Gly Tyr Gly Gly Tyr Gly Ser Asp Ser

15

20

25

<210> 49

<211> 23

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 49

Gly Ser Gly Ala Gly Gly Val Gly Gly Gly Tyr Gly Arg Gly

5

10

Asp Ser Gly Tyr Gly Ser Gly Ser Ser

15

20

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<213> *Antheraea yamamai*

<220>

<400> 50

Gly His Gly Arg Ser Ser Gly Ser

5

<210> 51

<211> 21

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<400> 51

Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Asp Tyr

5

10

Gly Ser Tyr Gly Ser Asp Ser

15

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<220>

<400> 52

Ser Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Asp

5

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Tyr Gly Gly Tyr Gly Ser Asp Ser

15

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Gly Ser Gly Ala Gly Gly Ser Gly Gly Gly Tyr Gly Trp Gly

5

10

Asp Gly Gly Tyr Gly Ser Asp Ser

15

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Ser Arg Arg Ala Gly His Asp Arg Ala Tyr Gly Ala Gly Ser
5 10

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Gly Ala Gly Ala Ser Arg Pro Val Gly Ile Tyr Gly Thr Asp
5 10
Asp Gly Phe Val Leu Asp Gly Gly Tyr Asp Ser Glu Gly Ser
15 20 25

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<220>

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Ser Ser Ser Gly Arg Ser Thr Glu Gly His Pro Leu Leu Ser
5 10
Ile Cys Cys Arg Pro Cys Ser His Arg His Ser Tyr Glu Ala
15 20 25
Ser Arg Ile Ser Val His
30

<210> 57
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<400> 57
Gly Ala Gly Ala Gly Ser Gly Ala Gly Ala Gly Ser Gly Ala
5 10
Gly Ala Gly Tyr Gly Ala Gly Tyr
15 20

<210> 58
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<400> 58
Gly Ala Gly Ala Gly Ser Gly Ala Ala Ser Gly Ala Gly Ala
5 10
Gly Ala Gly Ala Gly Ala Gly Thr
15 20

<210> 59
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<213> *Bombyx mori*

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<400> 59

Ala Ala Ser Ser Val Ser Ser Ala Ser Ser Arg Ser Tyr Asp

5

10

Tyr Ser Arg Arg Asn Val Arg Lys Asn

15

20

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<220>

<400> 60

Gly Ser Ser Gly Phe Gly Pro Tyr Val Ala His Gly Gly Tyr

5

10

Ser Gly Tyr Glu Tyr Ala Trp Ser Ser Glu Ser Asp Phe Gly

15

20

25

Thr

<210> 61

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<400> 61

Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala

5

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<210> 62

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<400> 62

Tyr Gly Trp Gly Asp Gly Gly Tyr Gly Ser Asp Ser

5

10

<210> 63

<211> 16

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<213> *Antheraea yamamai*

<220>

<400> 63

Ser Gly Ala Gly Gly Ser Gly Gly Tyr Gly Gly Tyr Gly Ser

5

10

Asp Ser

15

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<220>

<400> 64

Gly Ser Gly Ala Gly Gly Arg Gly Asp Gly Gly Tyr Gly Ser

5

10

Gly Ser Ser

15

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Arg Arg Ala Gly His Asp Arg Ala Ala Gly Ser

5

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Asp Glu Tyr Val Asp Asn

5

<210> 67

<211> 20

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Val Glu Thr Ile Val Leu Glu Glu Asp Pro Tyr Gly His Glu

5

10

Asp Ile Tyr Glu Glu Asp

15

20

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<213> *Antheraea yamamai*

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<400> 68

Asp Asp Gly Phe Val Leu Asp Gly Gly Tyr Asp Ser Glu

5

10

<210> 69

<211> 6

<212> PRT

<213> *Bombyx mori*

<220>

<400> 69

Gly Ala Gly Ala Gly Ser

5 .

<210> 70

<211> 6

<212> PRT

<213> *Bombyx mori*

<220>

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Asp Ser Asp Gly Asp Glu

5

<210> 71

<211> 6

<212> PRT

<213> *Bombyx mori*

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<400> 71

Asp Glu Asp Glu Asp Glu

5

<210> 72

<211> 6

<212> PRT

<213> *Bombyx mori*

<220>

<400> 72

Glu Asp Glu Asp Glu Asp

5

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<211> 6

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<213> *Bombyx mori*

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Ser Ser Glu Ser Ser Glu

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<213> *Bombyx mori*

<220>

<400> 74

Tyr Gly Gly Tyr Glu Tyr

5

<210> 75

<211> 7

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 75

Asp Gly Gly Tyr Gly Gly Asp

5

<210> 76

<211> 6

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 76

Asp Glu Tyr Asp Glu Tyr

5

<210> 77

<211> 8

<212> PRT

<213> *Antheraea yamamai*

<220>

<400> 77

Tyr Glu Glu Asp Tyr Glu Glu Asp

5

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<223> Cell growth promoting activity

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Glu Glu Glu Glu

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Glu Glu Glu Glu Glu Glu

5

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Glu Tyr Glu Tyr Glu Tyr

5

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<223> Cell growth promoting activity

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Glu Glu Tyr Glu Glu Tyr

5

<210> 82

<211> 6

<212> PRT

<213> Artificial sequence

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<223> Cell growth promoting activity

<400> 82

Tyr Tyr Tyr Tyr Tyr Tyr

5

<210> 83

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<223> Cell growth promoting activity

<400> 83

Glu Gly Ser Glu Gly Ser

5

<210> 84

<211> 10

<212> PRT

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<400> 84

Glu Glu Glu Glu Glu Glu Glu Glu Glu Glu

5

10

<210> 85

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<400> 85

Tyr Tyr Tyr Tyr